RESTRICTED

# MED. SEC. GHQ. FEC.

VOL V NO 9
1 SEP 1950



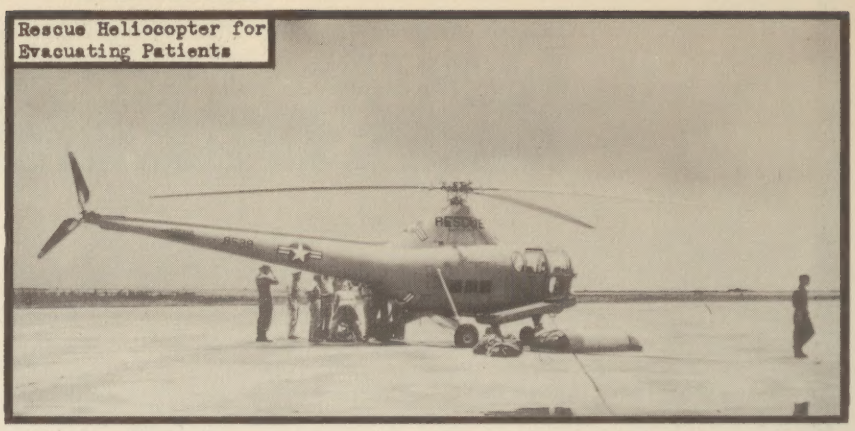
A FAR EAST PERIODICAL OF MEDICAL DEPARTMENT INFORMATION

# SURGEON'S CIRCULAR LETTER

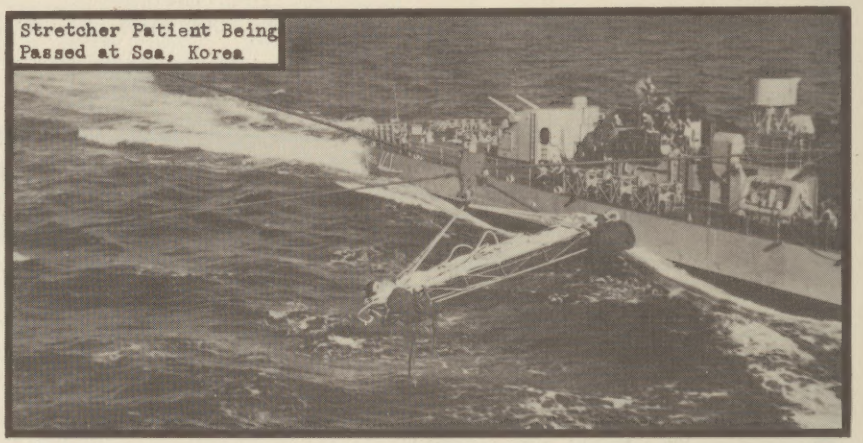
RESTRICTED

Evacuation of ROK Soldier, ONGCHONGDONG, Korea

Rescue Heliocopter for Evacuating Patients

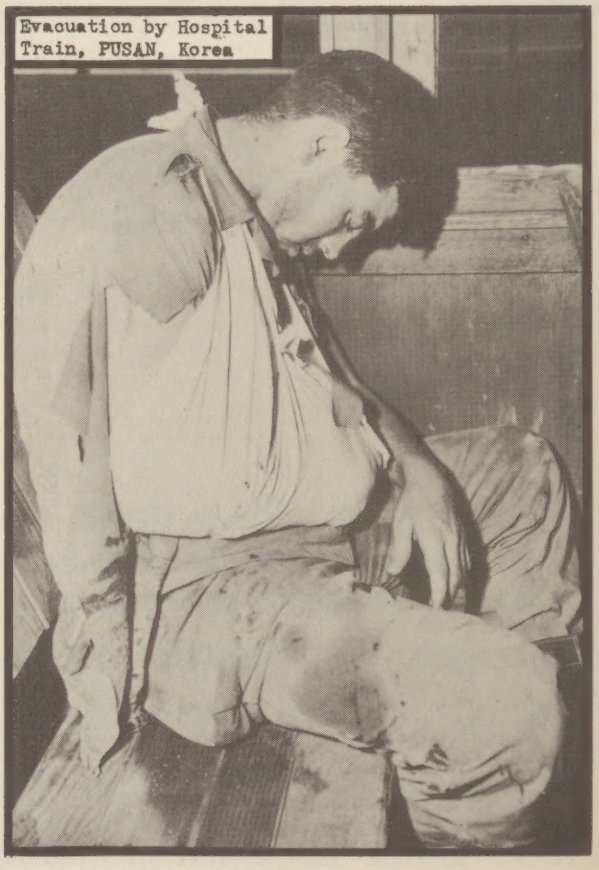


Stretcher Patient Being Passed at Sea, Korea

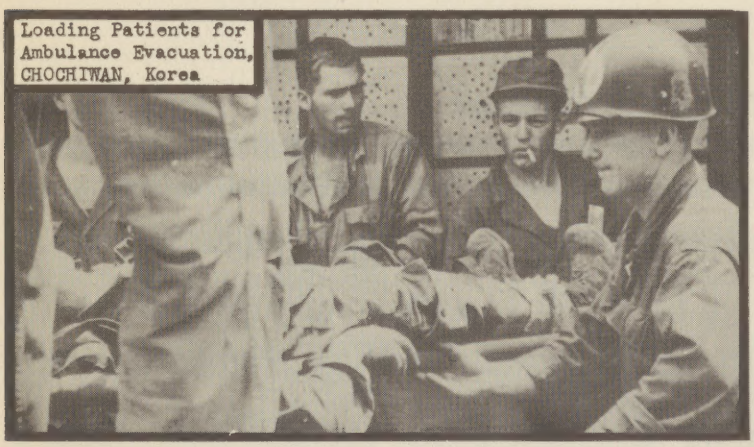


Camouflaged Litter Jeep, "?", Korea

Evacuation by Hospital Train, PUSAN, Korea



Loading Patients for Ambulance Evacuation, CHOCHIWAN, Korea



GENERAL HEADQUARTERS
FAR EAST COMMAND
MEDICAL SECTION

SURGEON'S CIRCULAR LETTER — APO 500

NO. . . . . 9 — 1 September 1950

PART I

ADMINISTRATIVE



## I. Organization of the Medical Section

Departure from the Medical Section, GHQ, FEC: Colonel Irby R. Pollard, VC, Veterinary Consultant, has completed his overseas tour of duty and returned to the zone of the interior.

## II. Awards to Medical Department Personnel

The following Medical Department personnel have been awarded the Silver and Bronze Star Medal for exceptional bravery in face of the enemy and meritorious service in the Korean situation:

Capt. Linton J. Buttrey, MSC, Silver Star
1st Lt. Raymond E. Adams, MSC, Silver Star
Cpl. Elijah C. Johnson (posthumous), MD, Bronze Star Medal
Maj. George Blanchard, DC, Bronze Star Medal
Capt. Viola B. McConnell, ANC, Bronze Star Medal
1st Lt. Robert B. Giffin, Jr., MC, Bronze Star Medal
Sgt. Victor DiGiovanni, MD, Bronze Star Medal
Sgt. Ray J. Cutierrez, MD, Bronze Star Medal
Cpl. Robert A. Pierce, MD, Bronze Star Medal
Pfc. George F. Borden, MD, Bronze Star Medal
Sgt. Thomas J. Fay, Jr., MD, Bronze Star Medal

## III. Changes in Designation of Army Medical Treatment Facilities


The following is an extract from Department of the Army General Orders, No. 21, 6 July 1950, "Changes in Designation of Army Medical Treatment Facilities", which pertains to medical treatment facilities in the Far East Command:

"3. Redesignation of T/D hospitals, infirmaries, and dispensaries outside continental United States. -- EFFECTIVE 1 JULY 1950 hospitals, infirmaries, and dispensaries operating under tables of distribution authorization, as distinguished from tables of organization and equipment, and not included in paragraph 1, are redesignated as US Army Hospital, US Army Infirmaries, and US Army Dispensaries, as appropriate, with location, e.g., 'US Army Dispensary, Guam'."

The medical treatment facilities in the Far East Command affected by this general order are:

| OLD DESIGNATION | NEW DESIGNATION | LOCATION |
|---|---|---|
| Osaka General Hospital | Osaka Army Hospital | Osaka, Japan |
| Tokyo General Hospital | Tokyo Army Hospital | Tokyo, Japan |
| Ryukyus Army Hospital | Ryukyus Army Hospital | Uchitomari, Okinawa |
| US Army Philippine Scout Hospital | US Army Hospital (PS) | Fort William McKinley, Manila, P.I. |
| MARBO General Dispensary | US Army Dispensary | Guam |

IV. Reserve Commission for Female Personnel in MC, DC, VC, and MSC

The Department of the Army has announced that the commissioning of female personnel in the Reserve Sections of the Medical, Dental, Veterinary and Medical Service Corps is now authorized. Applications will be processed as outlined in Department of the Army Circular 210, 1948, as amended. Professional and other criteria will be the same as for male personnel except that female applicants will be phvsically examined in accordance with AR 40-100 and AR 40-105.

V. Medical Officers Certified

Three Regular Army medical officers were certified recently by American specialty boards. The officers and their specialties are: Colonel George M. Powell, Internal Medicine; Lt. Colonel Robert S. Higdon, Dermatology and Syphilology, and Major David E. MacQuigg, Anesthesiology.

VI. Most Army Medical Interns Remain in the Service - DA SGO Technical Information Office, Wash, D.C.

Over 75% of the medical graduates who interned in Army hospitals under the Military Intern Training Program have remained in the Army longer than their legal requirement for active duty, according to figures released recently by Major General R. W. Bliss, the Army Surgeon General.

The postwar Military Intern Training Program started 1 July 1947. Since then three groups, totaling 311, have completed internship training in Army hospitals as officers commissioned in the Medical Corps Reserve. At the end of the training period, they could accept Regular Army Commissions, if tendered, and remain in the service. Otherwise, they could either remain on active duty under their Reserve Commissions or return to civilian life.

Of the 311 young physicians who have passed through the program, 235 have elected to remain on active duty in the Army Medical Service, either as Regular or Reserve officers. Of the other 76, several have requested return to active duty after a comparatively brief period of nonmilitary practice. All but seven of the 76 retained their Reserve commission.

Each of the three groups showed approximately the same percentage of post-interns accepting prolonged military service. The first group, which started in 1947, numbered only 25, of whom 19 remained in uniform after completing their training. The 1948 group of 113 found 87 remaining on active duty at the end of the training year. Of the 173 doctors who ended their internships last, 129 have decided to continue in the Army.

VII. Use of Abbreviated Clinical Records

The following information contained in a radio message from the Department of the Army is published as a matter of interest for personnel concerned:

"Use of abbreviated clinical record DA AGO Form 8-34 in conjunction with DA AGO Form 8-33 to facilitate patient processing is authorized CINCFE for use for battle casualties evacuated to ZI in those cases where these forms are adequate to reflect the clinical information which has been worked up and can be made available for use in subsequent care of patient."

## VIII. Special Regulations No. 600-450-2

Department of the Army Special Regulations No. 600-450-2, "Disposition of Military Personnel Subsequent to Appearance Before Physical Evaluation Boards", dated 28 June 1950, is published herein for information and guidance of all personnel concerned.

"1. Detached service.--a. Effective upon receipt of these regulations military personnel who have been processed by physical evaluation boards, as provided for in AR 600-450 and SR 600-450-1, who are recommended for separation or retirement and whose mental or physical condition does not preclude release from the hospital may be placed, with their consent and without expense to the Government, on detached service at their homes or such other place as they may select, other than a military organization, to await final action by the Department of the Army.

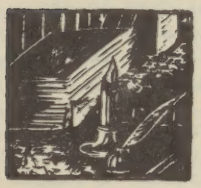
b. Individuals, qualified as stated above for release from the hospital, who do not desire to be placed on detached service as indicated in a above, may be placed on detached service with the hospital detachment or with the military installation nearest the hospital, for the performance of such duties as their physical capabilities will allow.

c. Personnel referred to above will not be charged against personnel allotments of hospitals or stations concerned.

"2. Preparation of separation forms.--All separation forms in applicable cases, so far as practicable, will be prepared prior to departure of personnel referred to above, so as to preclude the return of the individual upon receipt at the hospital of final action by the Department of the Army directing separation or retirement.

"3. Separation action.--Administrative action to effect separation will be accomplished by the hospital which placed the individual on detached service. It is not intended to preclude actual return to the hospital of individuals referred to above for separation purposes when extensive travel is not involved or when individuals referred to in paragraph 1 desire to return to the hospital at their own expense."

## IX. Recent Department of the Army and FEC Publications



AR 42-40, 6 Jul 50 - Disease Prevention and Control; Quarantine Regulations for Vessels and Aircraft of Armed Forces

AR 615-203, 25 Jul 50 - Classification, Assignment and Transfer of Conscientious Objectors

DA CIR 35, 1 Jul 50 - Sec VIII Medical Treatment in Army Medical Facilities, Fiscal Year 1951 - Rates

DA CIR 37, 12 Jul 50 - Fibrin Film, Human, 8 By 13 Cm (Medical Stock No. 1-604-775)

DA CIR 39, 20 Jul 50 - Rates Authorized for Civilian Medical Service

GO 21, 6 Jul 50 - Changes in Designation of Army Medical Treatment Facilities (See Section III, this issue)

SR 40-305-6, 14 Jun 50 - Serum Specimens for Standardization of Diagnostic Bacterial Antigens

SR 600-450-2, 28 Jun 50 - Disposition of Military Personnel Subsequent to Appearance before Physical Evaluation Boards ( See Section VIII, above)

SR 310-30-1, 12 Jul 50, C-1 - Organization and Equipment Authorization Table

SR 940-10-10, 19 Jul 50 - Relationship Between American Red Cross and Army Personnel in Army Hospitals

SR 40-505-11, 20 Jul 50 - Civilian Medical Care for Army Personnel

SR 55-125-5, 22 Jul 50 - Subsistence of persons traveling in connection with group movements of patients between hospitals

SR 605-60-43, 24 Jul 50, C-2 - Medical Officer Procurement, Professional Training Program

SR 40-505-15, 26 Jul 50 - Admission and Treatment of Veterans Administration Beneficiaries in Army Medical Treatment Facilities

SR 40-1080-11, 28 Jul 50 - Reporting of Bed Capacity and Bed Status Data by Medical Treatment Facilities not Classified as Fixed

RT 8-667-20, 9 Jun 50 - Army Medical Depot (Active Army)

TM 8-241, Mar 50 - Military Psychiatric Social Work

TM 8-270, Apr 50 - Professional Nursing Techniques

## PART II

## TECHNICAL



### X. Proper Procedure for Smallpox Vaccination*

A highly virulent form of smallpox has been endemic and epidemic in Korea at intervals during the past several years. There were large outbreaks in 1946 and again in 1948. (A large number of cases occurred among American personnel stationed in Korea in 1946.) Strict attention to satisfactory smallpox vaccination will be required to protect troops in Korea and other areas in the Far East Command.

The procedure of smallpox vaccination is not to be undertaken lightly nor with the idea that it requires neither skill nor attention. The contrary is true. It is only successfully performed vaccinations that protect against smallpox. A poorly performed procedure, not correctly interpreted, is worse than useless in that it gives rise to a false sense of security.

Prior to the application of the vaccine, the arm should be prepared by washing with soap and water and thoroughly dried. Ether or acetone may be applied to the area but it must be allowed to dry completely before the vaccine is deposited on the skin. It is extremely important to emphasize that alcohol or other skin antiseptics should never be used in the preparation of the vaccination site. Such antiseptics tend to inactivate the virus and hence, reduce the probability of a successful vaccination. For accomplishment of the vaccination procedure, the multiple pressure method should be used. In applying this method, it is to be clearly understood that the needle is to be held essentially parallel to the skin and the side of the needle point pressed through the drop of the vaccine and into the skin about 30 times. A little resistance should be felt as the needle point is raised and no blood should be drawn. A common error in this procedure is made when the needle is held perpendicular to the skin rather than horizontal and the point then applied directly, thus making multiple "punctures" rather than multiple pressures. It is the MULTIPLE PRESSURE and NOT the multiple puncture method which is now accepted as being the most satisfactory procedure for the application of smallpox vaccine. Excessive trauma interferes with the proper interpretation of the vaccination reaction.

The area of the vaccination should be kept small. There is no proven relationship between the size of the reaction produced and the degree of immunity resulting. An area approximately 1/8th inch in diameter is considered satisfactory.

No dressing should be applied following vaccination. Complications to vaccination, rare as they are, occur much more frequently in the presence of a dressing than when none is used.

It should be continually emphasized that smallpox vaccination properly performed and interpreted will prevent smallpox but that to accomplish this purpose the procedure must not be routinized to the extent that meticulous care in its accomplishment is sacrificed. It should also be emphasized that, if there is known or even suspected exposure of an individual or group to smallpox, revaccination should be accomplished at once without reference to previous vaccination history. The procedure requires little time and negligible disability results. It should be clearly understood that while the occurrence of an immune reaction signifies a certain state of immunity in the individual concerned the production of this reaction

* The administration of the annual stimulating doses of smallpox and typhus vaccination to personnel in Japan and Korea is to be accomplished as soon as possible after 1 September 50. Ref: GHQ FEC Ltr AG 720.3 (28 Jul 50)MD-C, subj: Smallpox and Typhus Immunizations, dated 28 Jul 50.

will in itself stimulate the immunity already present and thus build it to a higher level.

Proper interpretation of the reaction produced following smallpox vaccination is perhaps the single most important feature of the entire procedure. Failures of vaccination should not result if potent vaccine is used and the method of its application is correct. However, on occasion, factors beyond the control of the vaccinator may cause a failure. When this occurs, revaccination is to be accomplished as many times as necessary until a satisfactory result is obtained. If the failure is not noted, however, and the necessary revaccination is not accomplished, the individual concerned may well be completely unprotected. In such an instance, the medical officer responsible for the conduct of the vaccination is entirely responsible and can be judged only as failing to perform his professional duty. An occasional failure to obtain a satisfactory reaction after vaccination may be justified. That such failure be unrecognized cannot be justified.

Great emphasis should be given to the fact that a definite reaction must occur and must be observed before the vaccination can be considered as satisfactory. The absence of a reaction must in all instances be interpreted as a failure of vaccination. In no instance should the word of the vaccinated individual be taken as to the presence or absence of a reaction. The interpretation must be made by a medical officer himself or an individual in whom he has complete confidence and whose word he is completely willing to accept. The responsibility, however, lies directly and entirely with the medical officer concerned. It is apparent from the occurrence of smallpox during World War II that failures on the part of medical officers to interpret smallpox vaccinations accurately and to revaccinate when indicated have resulted in numerous cases and deaths from this disease.

The reactions which follow a successful vaccination are vaccinia or primary reaction, vaccinoid or accelerated reaction, or immune or immediate reaction. These are adequately described in TB MED 114, November 1944. They are also well described and illustrated in the text "Military Preventive Medicine" by Dunham, published by the Military Service Publishing Company. Every medical officer should be completely familiar with these various reactions and have a full knowledge as to their significance. Most important of all, every medical officer should be completely aware of the fact that a successful vaccination is always followed by one or the other of these reactions. No reaction at all means that the vaccine was impotent or that the procedure was performed in an unsatisfactory manner.

No vaccination should be considered to have been completed until interpreted and the type of reaction recorded on the individual's immunization register. In general, vaccinations should not be performed unless it is known that the individual to be vaccinated will be available for a period of at least one week during which time the necessary observations may be made. If at any time it is impossible to comply with this general rule, it is incumbent upon the officer responsible for the performance of the vaccination to arrange for satisfactory interpretation and recording by a competent and reliable individual. The medical officer's initials following a smallpox vaccination entry on the immunization register indicates not only that the vaccination was performed but also that a satisfactory result was obtained.

Key points of importance in the conduct of successful vaccination may be summarized as follows:

Use of potent vaccine shipped and stored under proper conditions (at freezing temperatures or directly on ice).
Use of vaccine within its expiration date.
Proper preparation of the vaccination area.
The multiple pressure method of vaccination, correctly executed.
Proper interpretation of the vaccination result.
Recording and certification of the vaccination reaction.
Repetition of all unsuccessful vaccinations.

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XI. Differential Diagnosis of Rash in Children - Major Milton H. Hollander, MC, Chief Pediatric Section, Osaka Army Hospital, APO 25-5

The problem of differential diagnosis of rash in infants and children is a recurring and often puzzling one. A brief review of the pertinent facts of the more common diseases is herewith presented.

MEASLES (Rubeola)

Rash spreads from above down. Involves first hairline, then face and neck, then body and lastly lower extremities. Reaches feet on third day. Maculopapular or morbilliform. Associated with severe hacking cough, coryza, conjunctivitis and photophobia. Koplik's spots

pathognomonic, when seen. Fever rises (104-105°) abruptly when rash develops. Leukopenia with relative lymphocytosis. Disease may be very mild if immune globulin has been used.

GERMAN MEASLES (Rubella)

Rash preceded by enlarged, tender retro-auricular, posterior cervical and post-occipital glands by 24 hours. Usually begins on face, spreads rapidly. Maculopapules present in addition to large areas of flushing. Rash disappears by third day. Slight or no fever with rash. Temperature usually below 101°. May simulate measles or scarlet fever, but lacks other signs. White blood count normal. (Probably wise to deliberately expose girls during childhood.)

ROSEOLA INFANTUM (Exanthem Subitum)

Occurs between the ages of 6 months and 3 years. Sudden onset with fever which may be high (103-106°), lasting three to four days, with no apparent cause. As fever drops to normal, rash appears. Discrete, macular or maculopapular, over trunk with some on face, but does not extend beyond shoulder or below upper thigh. Rash fades in 8-24 hours. WBC slightly elevated early (9,000-14,000), but get leukopenia (3,000-5,000) with shift to lymphocytosis (up to 90%) when rash appears.

SCARLET FEVER (Scarlatina)

Preceded by headache, fever, sore throat and vomiting. Diffuse finely papular, bright red erythema which blanches on pressure. Feels much like sandpaper. Begins at base of neck, in axillae and groin, and later on trunk and extremities - but not on face. Cheeks flushed, with circumoral pallor. Rumpel-Leede sign positive. Tongue coated early, beefy red by third-fourth day. WBC elevated (10,000-20,000) with 75-90% neutrophiles. Eosinophilia (4-20%) often at one week. Rash fades in three to seven days, leaving branny type desquamation.

CHICKEN POX (Varicella)

Highly contagious. Slight fever, malaise precedes rash by one day. Successive crops of vesicles on skin and mucous membranes. Starts on trunk, then face and shoulders, spreading toward periphery. Distal parts of extremities not involved. Small red papules quickly form clear "tear-drop" vesicles on an erythematous base. Vesicles continue to erupt over period of three to four days. Lesions seen in all stages of development at same time. Vesicles are easily broken, become scabbed. Vesicles never become umbilicated. Pruritus always present. Generalized lymphadenopathy.

SMALLPOX (Variola)

Most highly contagious. Prodrome of high fever (up to 106°) lasts three to four days. Tends to drop when rash appears, rises again later as vesicles become cloudy. Rash starts on periphery, spreads to trunk. Begins as raised macules, then papules, later multilocular vesicles with umbilicated appearance. More frequent over areas of pressure or tightness of skin (nose, wrists, beltline). Many lesions on face, some on palms and soles. Feel "shotty", deep to touch. All in same stage of development. Vesicles lose small red areola, become cloudy by 5th day. Scabs develop which drop off by 3rd to 4th week, lastly from palms and soles. Neutropenia early, with leukocytosis later.

PITYRIASIS ROSEA

Self-limited, non-contagious. Pink or reddish erythemato-squamous patches, dime to quarter size, often oval, tend to follow cleavage lines of skin. Involves trunk, upper arms and thighs. Herald patch may precede by days to a week. No fever, sometimes pruritic. Clears spontaneously in 6 weeks, less with treatment.

SECONDARY SYPHILIS

May involve entire body or be present only on face, back and extremities. Maculopapular, circular, slightly elevated, red early then becoming brownish. Fades over a period of days. Does not itch. Serology positive. May have fever and pharyngitis.

INFECTIOUS MONONUCLEOSIS

Rash appears at about 7th day of illness. Present in 10-15% of cases. Discrete, macular eruption over trunk, lasts 3-7 days. Non-pruritic. Moderate leukocytosis with increase in mononuclears. Heterophile antibody test usually positive during first week.

DRUG RASH

Due to ingestion (e.g., phenobarbital, dilantin, belladonna, sulfonamides, coal-tar derivatives) and contact. Simulates Rubella, Scarlet Fever. Usually more intense on extremities.

IMPETIGO CONTAGIOSA

Contagious. Due to streptococci and staphylococci. Superficial vesicles appear which quickly become purulent, rupture and form crusts. Crusts appear "stuck on", cigarette-paper like. Can involve any part of skin, especially common on face, ears, nares. Several lesions may become confluent with central healing. Mild itching present.

SCABIES

Multiform eruption with papules, vesicles, crusts, excoriations and thickening. Burrows, especially in webs of fingers, flexors of wrists. Predilection for flexor surfaces wrists, arm, axillary folds, umbilicus, buttocks, penis and toes (especially in infants). On face only in young infants. May resemble eczema in young infants. Pruritic, notably at night. Secondary infection common. If untreated, may last indefinitely, with no tendency to spontaneous healing.

REFERENCE: "Handbook of Communicable Diseases" by Top. 2nd Edition, 1947.

XII. Addition to Recommended Laboratory Methods for Use in Diarrheal Diseases - Maj. Arvey C. Sanders, MSC, 406th Medical General Laboratory, Tokyo, Japan

The formula for buffered glycerol saline soluation as stated in recommended laboratory methods for use in diarrheal diseases, Surgeon's Circular Letter, 1 July 1950, page 14, is not complete in that the amount of glycerine required is not stated. The complete formula is as follows:

| | |
|---|---|
| $Na_2HPO_4$. . . . . | 2.5 g. |
| $NaH_2PO_4$. . . . . | 0.6 g. |
| Saline (0.85%) . . . . . | 1000 cc. |

Mix 300 ml. of glycerine and 700 ml. of the above buffered saline solution. Add formalin, 1:10,000, and 4 ml. of 0.2% Phenol Red for 1000 ml. Dispense in 10 to 12 ml. amounts in one ounce screw capped vials. Sterilize at 15 lb. for 20 minutes.

XIII. Thyroid Function in Mental Disease - A Multiple Test Survey*

This is the second report of a study of thyroid function in patients with mental disease, which has been in progress for two years. It is a study that is concerned with the investigation of so-called organic factors in mental disease, as contrasted with the current emphasis upon psychodynamic factors.

The "organic approach" in psychiatry is not new; it was emphasized by Kraepelin in 1896 in his original formulation of dementia praecox as a disorder of metabolism. On the basis of careful clinical observation he concluded that the cases have a definite course and always eventuate in a certain degree of dementia due to a definite organic process.

The advent of psychoanalysis shortly thereafter obscured this emphasis upon the organic context of psychiatric disorder. However, with the development of various laboratory techniques particularly of a biochemical character for the investigation of clinical pathology this interest was revived. In the past thirty years there have been published over one thousand studies, including almost every known clini-

* Authors: Karl M. Bowman, M.D.; Earl R. Miller, M.D.; Morris E. Dailey, M.D.; Alexander Simon, M.D.; Berdeen Frankel Mayer, M.D.
From The Langley Porter Clinic, California State Department of Mental Hygiene, and the Divisions of Psychiatry, Radiology, and Medicine of the University of California School of Medicine, San Francisco, California.

cal measurement and laboratory procedure, on groups of patients with mental disease. The results in general have been only suggestive. Different investigators have reported significant differences from normal subjects in different directions on almost all these tests.

One common finding has been that the range and variability of test results are greater in patients with emotional disturbance than in normal subjects. This has given rise to the hypothesis that there is a defect in the homeostasis mechanisms in patients with mental disease resulting in inadequate physiological response to stressful situations. This theory of defective homeostatic control of physiological processes is the background against which current organic research in psychiatry is being carried out.

There has been, for many years, considerable speculation as to the possible role of the thyroid gland in mental illness, if any. The personality changes which occur in hyper-and hypothyroidism have long been known. It has been repeatedly demonstrated by many investigators that the basal metabolic rate is abnormally low in over 50% of schizophrenic patients. There is a recent report that many patients with schizophrenia tolerate up to 60 grains a day of thyroid substance without evidence of toxicity. The significance of these phenomena has not been established, but the possibility has remained that thyroid function in mental disease is in some unknown way abnormal.

The present study was undertaken because of the advent of two relatively new biological techniques, the radioactive iodine test and the serum protein-bound iodine test. These two tests seem more closely and more exclusively related to thyroid activity than basal metabolic rate and plasma cholesterol, the two tests used most frequently in the past to evaluate thyroid function. In addition it was thought that the use of four tests: protein-bound iodine, radioactive iodine, basal metabolic rate, and plasma cholesterol, each of which reflects a different aspect of thyroid physiology, would give more information about the status of the thyroid gland than any single test. Therefore, the present study, a multiple test survey of thyroid function in mental disease, was undertaken.

OBJECTIVES:

An attempt is made in this study to answer the following questions:

1. Is thyroid function normal in patients with mental disease by clinical evaluation, and as measured by four tests reflecting different aspects of thyroid physiology: basal metabolic rate, serum protein-bound iodine, radioactive iodine, and plasma cholesterol?

2. How does this compare with test results in patients with known thyroid disease?

3. Is there any difference in test results in patients with different types of mental illness?

METHOD:

Three groups of patients were studied: (1) schizophrenia, (2) manic-depressive psychosis, and (3) mixed psychoneurosis.

With few exceptions, the following criteria were applied in the selection of patients:

1. Concurrence of opinion by the psychiatric staff as to diagnosis.
2. Age range to include only postpubertal cases and to avoid those with clinical evidence of menopausal or senile complications.
3. Absence of complicating organic findings (e.g., head injury, diabetes, etc.)
4. No previous somatic therapy for psychiatric disorders.
5. All cases early, preferably hospitalized for the first time.

Patients studied with all four tests were selected from the regular in-patient group of The Langley Porter Clinic, according to these criteria. All participated in the regular ward and recreational activities. All were on the regular hospital diet and the nutritional status of the group was good. A number of additional patients, most of whom were outpatients, were given only the serum protein-bound iodine test. These patients were also in the manic, depressive, and psychoneurotic classifications.

Control subjects were volunteers from the clerical and medical staff of The Langley Porter Clinic and non-psychiatric, euthyroid patients from the University of California Hospital. The Langley Porter Clinic controls were matched with psychiatric patients as closely as possible as to age and sex, and were examined to exclude mental illness and previous thyroid or other organic disease. Some controls from the University of California Hospital had other organic disease.

PROCEDURES:

A thorough medical and psychiatric evaluation was made of each patient and the following tests carried out: (1) Serum protein-bound iodine (PBI)*; (2) radioactive iodine (RAI); (3) basal metabolic rate (BMR)**; (4) plasma cholesterol***; (5) chest film; (6) complete blood count; (7) sedimentation rate; and (8) urinalysis.

The first four tests were usually done within at least 48 hours of each other, with the patient in a fasting state. The initial series of tests was usually performed soon after the patient entered the hospital, and, in any case, at a time when the patient was severely ill. Patients were then assigned to various therapies decided upon by the psychiatric staff. All four tests were repeated at various intervals, and especially when a significant change in clinical condition occurred. An interval of at least 48 hours and preferably 5 to 7 days was allowed to elapse between the preliminary tests and repeat studies. In some cases the interval was as long as several months.

ANALYSIS OF DATA:

Means and standard deviations were obtained for all groups and sub-groups on all tests. Standard methods[I] were then used on the data for each test to determine the probability that any difference found between a psychiatric group and the controls, or between two psychiatric subgroups, might have appeared as the result of change differences in the sampling. A difference for which this probability is less than 1% is considered "highly significant", since there is less than 1 chance in 100 that it is attributable to chance. The likelihood is very great, therefore, that there is a true difference on this test between the populations from which these groups are drawn. Similarly, a difference for which the probability is between 1% and 5% is considered "significant", since the likelihood that the obtained difference has arisen by chance is still quite low. If the probability is greater than 5%, no significant or true difference in the populations is considered to have been demonstrated.

RESULTS:

A total of 61 subjects has been studied with all four tests. The number in each diagnostic classification, age, duration of illness, and length of hospitalization prior to study are given in the tables below:

(1) SUBJECTS IN EACH DIAGNOSTIC CATEGORY STUDIED WITH ALL FOUR TESTS

| Diagnosis | |
|---|---|
| Patients: | |
| Schizophrenic | 26 |
| Manic-depressive | 16 |
| Manic (5) | |
| Depressive (11) | |
| Psychoneurotic | 7 |
| Total Psychiatric Patients | 49 |
| Langley Porter Clinic Controls | 12 |
| Total subjects | 61 |

(2) RANGE OF AGES AND MEDIAN AND AVERAGE VALUES FOR ALL SUBJECTS

Age distribution in years:

| | Patients | Controls |
|---|---|---|
| Median | 28 | 32 |
| Average | 30.3 | 33.4 |
| Range | 16-55 | 20-60 |

* Micro-determination of the protein-bound fraction of serum iodine devised by Kolthoff and Sandell, and adapted by W. T. Salter under his personal supervision, is used. Further minor modifications have been made in our laboratory to increase the speed of reaction and decrease errors from contamination and loss of sample. Normal range: 4.0 to 8.0 micrograms per 100 cc of serum.

** The Benedict-Roth metabolism apparatus and the Dubois normal standards as modified by Boothby and Sandiford are used. Normal range: plus 10 to minus 10.

*** Determined according to the modification of the method of Bloor, Pelkan and Allen, adapted to the Klett photo-colorimeter. Normal range: 150 to 250 milligrams per 100 cc. plasma.

I Principally analysis of variance and the t test.

(3) APPROXIMATE DURATION OF CLINICALLY MANIFEST EMOTIONAL ILLNESS PRIOR TO HOSPITALIZATION

Median.....17 weeks
Average.....68.2 weeks
Range.....1-780 weeks

(4) LENGTH OF HOSPITALIZATION

Median.....21 days
Average.....47.5 days
Range.....1-517 days

(5) SEX OF SUBJECTS STUDIED

| | Patients | Controls |
|---|---|---|
| Male..... | 16 | 7 |
| Female..... | 33 | 5 |
| | 49 | 12 |

The duration of illness for the group as a whole is relatively short. The average is increased by the very few patients studied who had been ill for several years. The same is true for length of hospitalization prior to study; a few patients were transferred to The Langley Porter Clinic from other hospitals, increasing their total length of hospitalization and the average for the group. The median, 17 weeks for duration of illness, and 21 days for length of hospitalization, gives a more accurate impression of the group than the average. These intervals are relatively short compared to many studies of organic factors in mental disease in which patients have been chronically ill and hospitalized 15 to 20 years before study.

Unless otherwise specified, results reported refer to the initial (pre-therapy) series of tests which were carried out before treatment and at a time when the patient was considered to be displaying intense manifestations of his illness.

## THE SERUM PROTEIN-BOUND IODINE TEST

In this test the so-called protein-bound fraction, that is, the organic as compared to the inorganic iodine in the serum is measured. According to Cantarow and Trumper:

"Secretion of thyroid hormone varies in response to nervous (sympathetic) and hormonal (thyrotrophic) stimulation... Fluctuations in protein-bound or 'organic' iodine (in the serum) are very low in myxedema (below 4.0) and high in thyrotoxicosis (above 8.0) and may be assumed to represent variations in the quantity of circulating thyroid hormone."

The serum protein-bound iodine test, then, measures the amount of circulating thyroid hormone, and reflects one activity of the thyroid gland: secretion of thyroid hormone.

Results of the Test:

Seventy-one psychiatric patients were compared with 429 controls studied at the University of California Hospital. The psychiatric patients included 30 schizophrenics, 22 manic-depressives (6 manic and 16 depressive), 15 psychoneurotics, and 4 "other subjects". The number of subjects, mean, standard deviation, and range of serum protein-bound iodine for controls, total psychiatric patients, and psychiatric subgroups studied are shown in the following table:

Serum Protein-Bound Iodine Test

| | No. | Mean | Standard Deviation | Range |
|---|---|---|---|---|
| Controls | 439 | 6.187 | 1.034 | 4.0 - 8.8 |
| Total Psychiatric Patients | 71 | 5.79 | 0.97 | 3.3 - 8.0 |
| Schizophrenic | 30 | 5.99 | 1.00 | 4.4 - 8.0 |
| Manic-depressive | 22 | 5.43 | 0.98 | 3.3 - 7.7 |
| Manic | 6 | 5.25 | 1.18 | 3.3 - 7.0 |
| Depressive | 16 | 5.5 | 0.89 | 4.2 - 7.7 |
| Psychoneurotic | 15 | 6.06 | 0.75 | 4.8 - 7.7 |
| Other subjects* | 4 | -- | -- | ----- |

The means of all groups fall within the normal range. However, a significant difference was found between the means of normal and psychiatric groups, beyond the 0.25% level. The mean of the psychiatric

* Two patients diagnosed as Primary Behavior Disorder and two as Unclassified Psychosis were included in the total psychiatric group on this test only.

group was lower. This was found to be due primarily to the manic-depressive group, the only psychiatric subgroup that was significantly different from the controls. The level of significance of this difference was high, 0.08%. This indicates that the manic-depressive group has a significantly lower serum protein-bound iodine level than the normal. The probabilities are only 8 in 10,000 that this difference is due to chance.

The scores of the manic patients were slightly lower than the depressives but this difference was not significant. Figure 1 shows distributions of the various groups on the serum protein-bound iodine test.

On inspection of the graphed data for the total psychiatric group, it was noticed that the distribution seemed to fall into a diaphasic curve. (See Figure 2) Statistically a diphasic distribution curve

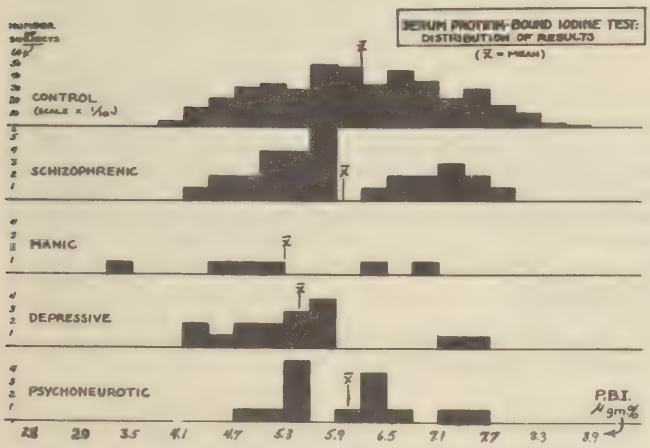


Figure 1.

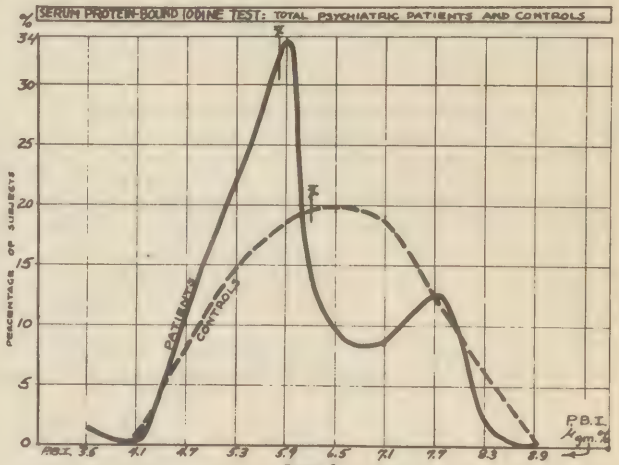


Figure 2.

indicates the existence of two different clinical populations. Thus a trend was found in the psychiatric group to separate into two groups, one in the high range of normal from about 6.0 to 8.0, and the other in the low range of normal from about 4.0 to 6.0 micrograms per cent. The schizophrenics were found to contribute most to this trend, (Figure 3). On further analysis it was discovered that all schizophrenics with scores above 6.3 were diagnosed as paranoid types while those with scores below this value were classified predominantly as catatonic and "other types." This was true not only on the first, but also on an average of from 1 to 5 serum iodine tests on each subject, (Chart No. 1). There was a highly significant difference, beyond the 0.1% level, in the means of these two groups. This separation of the two clinical schizophrenic groups on the serum protein-bound iodine test was a chance finding of considerable interest especially since no such finding was expected or sought, and since diagnoses were made by a psychiatric staff unacquainted with the findings of the research project staff.

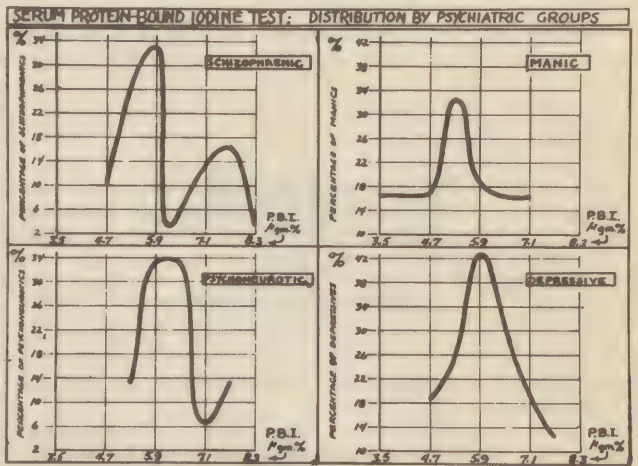


Figure 3.

CHART NO. 1

Scores of Schizophrenic Patients on Serum Protein-Bound Iodine Test

| SCHIZOPHRENIA | PBI (Test 1) | SCHIZOPHRENIA | PBI (Average 1-5 tests) |
|---|---|---|---|
| Other types | 4.6 | Catatonic | 4.9 |
| Catatonic | 4.6 | Other types | 5.0 |
| Other types | 5.0 | Catatonic | 5.1 |
| Other types | 5.2 | Other types | 5.2 |

CHART NO. 1 (Cont'd)

| SCHIZOPHRENIA | PBI (Test 1) | SCHIZOPHRENIA | PBI (Average 1-5 tests) |
|---|---|---|---|
| Catatonic | 5.2 | Catatonic | 5.3 |
| Paranoid* | 5.3 | Catatonic | 5.4 |
| Catatonic | 5.4 | Catatonic | 5.4 |
| Catatonic | 5.4 | Catatonic | 5.5 |
| Catatonic | 5.4 | Paranoid* | 5.5 |
| Catatonic | 5.5 | Other types | 5.6 |
| Paranoid* | 5.7 | Other types predominantly affective features | 5.6 |
| Catatonic | 5.8 | Paranoid* | 5.9 |
| Other types predominantly affective features | 5.9 | Undifferentiated Psychosis (Schizo-affective) | 5.9 |
| Undifferentiated Psychosis (Schizo-affective) | 5.9 | Catatonic | 6.3 |
| Catatonic | 6.3 | Catatonic | 6.3 |
| Paranoid | 6.8 | Paranoid | 6.3 |
| Paranoid | 6.8 | Paranoid | 6.3 |
| Paranoid | 7.0 | Paranoid | 6.6 |
| Paranoid | 7.0 | Paranoid | 6.8 |
| Paranoid | 7.2 | Paranoid | 6.8 |
| Paranoid | 7.4 | Paranoid | 7.2 |
| Other types predominantly Paranoid features. | 7.9 | Other types predominantly Paranoid features | 7.9 |
| Paranoid | 8.0 | Paranoid | 8.0 |

It can be seen that these patients separate into two diagnostic groups on the basis of their scores on the serum iodine test (with the exception of the patients who are starred).

## THE RADIOACTIVE IODINE TEST

In this test a small dose of the radioactive isotope of iodine, $I^{131}$, is administered to the patient and the manner in which it is collected by the thyroid gland is analyzed. The assumptions underlying the clinical use of $I^{131}$ are based upon experimental evidence indicating that (1) iodine in the body is concentrated maximally in the thyroid gland, and (2) inert iodine and $I^{131}$ act the same in the body.

It has been shown by animal experimentation that by far the largest part of thyroid iodine is in organic form, and that when exogenous iodine is administered it is rapidly incorporated into the thyroid protein molecule. If this is true in human subjects, then the uptake of $I^{131}$ by the thyroid gland reflects the ability of the gland to convert (incorporate) inorganic iodine into an organically bound form within the gland, and is truly a measure of one activity or function of the thyroid gland.

This is the first time to our knowledge that this or any other radioactive isotope has been used to study patients with mental disease. Exactly how this test can be made to yield the most information has not as yet been established. The objective clinically has been to determine which measure of radioactive iodine uptake best differentiates between normal and abnormal thyroid conditions, as compared with clinical evaluation.

Our objective has been to determine if there is any difference in radioactive iodine uptake in patients with mental disease as compared with normals. For this purpose we have used those measures of radioactive iodine uptake which have been studied and which seemed to give most information to date. These include:

1. The maximum per cent of a test dose of radioactive iodine that is taken up by the thyroid gland.
2. The per cent taken up in the early hours. We have studied the per cent taken up between 3 and 4 hours after ingestion (the per cent of the original test dose taken up by the thyroid gland, calculated from the Geiger Counter reading taken anytime between $2\frac{1}{2}$ and $4\frac{1}{2}$ hours).
3. The time in hours at which the maximum uptake occurs.
4. The "rate", or per cent per hour, of radioactive iodine taken up in the early hours, anywhere between two and seven hours.

It has been shown by Hamilton and Soley and many others that typical patterns of uptake are roughly related to normal, hyperthyroid and myxedematous states (Figure 4, page 13). The limits of normal maximum per cent uptake can be set roughly at between 15 and 45%. The normal limits of measures of radioactive iodine uptake other than maximum per cent have not as yet been definitely determined.

## $I^{131}$ Administration and Counting

A test dose* of 150 microcuries of $I^{131}$ in 30 cc. of water is given to the subject orally between 6:00 and 9:00 A.M. During the next 72 hours, 5 or 6 determinations (counts) of concentration of $I^{131}$ in the thyroid gland are made with the Geiger-Muller counter placed over the thyroid gland. Two counts are made on the day the $I^{131}$ is given, 2 counts on the second day, 1 or 2 on the third, 1 on the fourth, 1 on the fifth, and 1 on the eighth day. Each count lasts approximately ten minutes. The patient lies quietly on his back without discomfort of any kind.

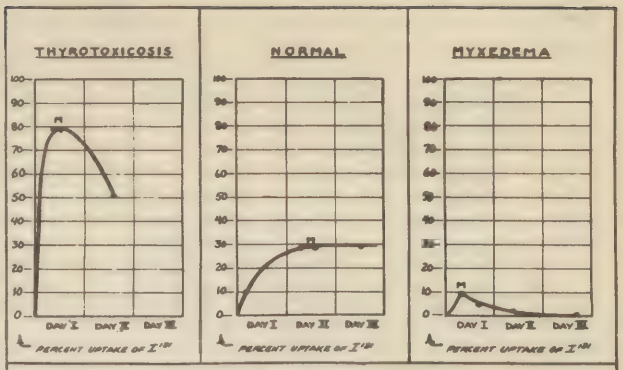



FIGURE 4.
TYPICAL RADIOACTIVE IODINE UPTAKE CURVES
(M = MAXIMUM)

### Results of the Test

### Per Cent Maximum Uptake

A total of 49 psychiatric patients was compared with 38 controls. The psychiatric group included 26 schizophrenics, 16 manic-depressives (5 manic and 11 depressive), and 7 psychoneurotics. The controls included 12 subjects studied at The Langley Porter Clinic and 26 patients evaluated clinically as being euthyroid, and found to have normal results on studies of thyroid function at the University of California Hospital. The results are as follows:

RADIOACTIVE IODINE TEST
Per Cent Maximum Uptake

| | No. | Mean | St. Dev. | Range |
|---|---|---|---|---|
| Controls | 38 | 28.1 | 8.70 | 8.2 - 47.7 |
| Total Psychiatric pts. | 49 | 30.4 | 9.59 | 8.9 - 62.8 |
| Schizophrenic | 26 | 33.6 | 9.84 | 16.8 - 62.8 |
| Manic-depressive | 16 | 25.5 | 7.07 | 8.9 - 40.0 |
| Manic | 5 | 19.0 | 6.63 | 8.9 - 28.0 |
| Depressive | 11 | 28.5 | 6.56 | 22.0 - 36.0 |
| Psychoneurotic | 7 | 30.1 | 8.81 | 13.0 - 40.0 |

The manics have a lower uptake than the controls. The difference is significant at the 3-4% level. The schizophrenics have a higher uptake than the controls, significant at the 2% level. The greatest difference is between the means of the schizophrenic and manic groups, who have the highest and the lowest means respectively. This difference is highly significant at the 0.1-1.0% level. The conclusions on this measure of the radioactive iodine test are that the per cent maximum uptake of radioactive iodine is definitely higher in schizophrenic patients than in normal controls, lower in manic patients than in normal controls, and much higher in schizophrenic patients than in manics. Figure 5 shows the distributions on this measure.

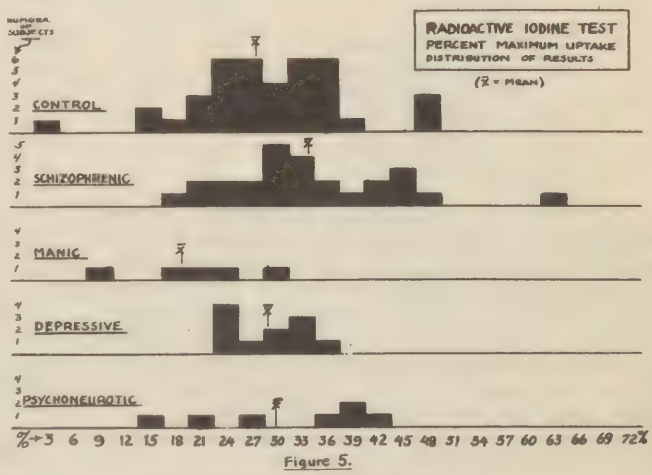



Figure 5.

### Per Cent Per Hour Uptake (measured between 2 and 7 hours)

A total of 49 psychiatric patients was compared with 38 controls, as on per cent maximum uptake. The results are as follows:

*A test dose is a quantity large enough so that the radiation can be measured, and small enough so that no harmful radiation effects occur. The amount of (radioactive)iodine that we have used for a test dose is so small that it cannot be detected in the blood by a biochemical test measuring in units of micrograms in 100 cc. of serum.

## RADIOACTIVE IODINE TEST

Per Cent Per Hour Uptake

| | No. | Mean | St. Dev. | Range |
|---|---|---|---|---|
| Controls | 38 | 4.2 | 3.28 | 2.1 - 10.8 |
| Total psychiatric pts. | 49 | 4.1 | 1.53 | 2.0 - 8.1 |
| Schizophrenic | 26 | 4.7 | 1.51 | 2.3 - 8.1 |
| Manic-depressive | 16 | 3.7 | 1.47 | 2.0 - 7.4 |
| Manic | 5 | 2.7 | 0.78 | 2.2 - 4.1 |
| Depressive | 11 | 4.2 | 1.48 | 2.3 - 7.4 |
| Psychoneurotic | 7 | 3.1 | 0.79 | 2.0 - 4.4 |

No significant difference was found between means of the total psychiatric patients and controls, or between the controls and any of the psychiatric subgroups.

There is a significant difference at the 0.9% level between the means of the schizophrenic and the manic groups, and from the 1-2% level between the mears of the schizophrenic and the psychoneurotic groups. This indicates that the schizophrenic group is significantly higher in per cent per hour uptake than the manic and psychoneurotic groups (Figure 6).

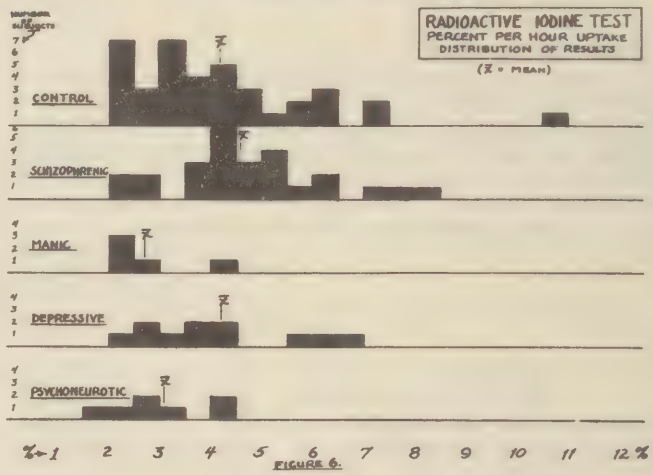


FIGURE 6.

### Per Cent Uptake in 3 to 4 Hours

A total of 47 psychiatric patients was compared with 11 controls. The types of patients are listed below. The eleven controls were normal subjects all studied at The Langley Porter Clinic. The results are as follows:

## RADIOACTIVE IODINE TEST

Per Cent Uptake in 3-4 Hours

| | No. | Mean | St. Dev. | Range |
|---|---|---|---|---|
| Controls | 11 | 14.14 | 5.76 | 6.6 - 24.9 |
| Total psychiatric pts. | 47 | 12.84 | 4.74 | 6.4 - 26.3 |
| Schizophrenic | 25 | 14.64 | 4.86 | 6.9 - 26.3 |
| Manic-depressive | 16 | 11.20 | 4.03 | 6.4 - 21.5 |
| Manic | 5 | 8.34 | 2.52 | 6.4 - 13.3 |
| Depressive | 11 | 12.5 | 3.92 | 7.6 - 21.5 |
| Psychoneurotic | 6 | 9.91 | 2.38 | 7.1 - 14.4 |

There is no significant difference between means of the total psychiatric patients, or of the psychiatric subgroups and controls. There is a significant difference at the 4% level between the means of schizophrenic and manic patients. Thus, as with per cent maximum uptake, the schizophrenic group is also higher in uptake of radioactive iodine between 3 and 4 hours than the manic group. (Figure 7)

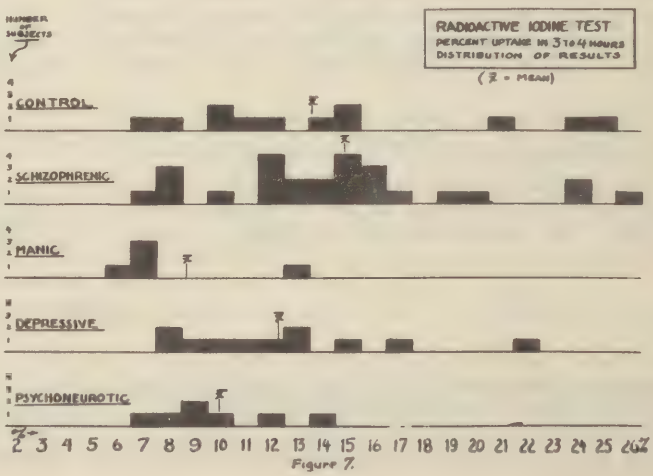


Figure 7.

### Time to Reach Maximum

A total of 49 psychiatric patients was compared with 12 controls. The manics have the lowest mean, 26.30, the depressives the highest mean, 38.41. However, no significant differences were found between the means of the psychiatric and control group, or any of the psychiatric subgroups on this measure.

It should be noted that this is an inadequate measure because an artifact is introduced by the set times at which the counts are taken. Radioactive iodine uptake was studied only over an 8 hour period each day, whereas the thyroid gland continues to be active over 24 hours; therefore, exact time to reach maximum on all patients is forced artificially into the periods between 24-32, 48-56 hours, etc. Thus a comparison of clinically different groups of patients might well not show significant differences on this measure, even if they exist.

## BASAL METABOLIC RATE TEST

Perhaps the most consistent independent finding by many different investigators among all the laboratory studies of organic factors in mental disease, has been that of low basal metabolic rate in patients with schizophrenia. There have also been some reports of low basal metabolic rate in groups of psychoneurotic patients.

The measurement of basal metabolic rate has been the classical test of thyroid function, for it has been well known that one of the most consistent effects of thyroid hormone in the circulation is regulation of the rate of tissue metabolism and oxygen consumption. This is a peripheral effect of the thyroid gland, and in this way the measurement of basal metabolic rate is indirectly or empirically related to the activity of the thyroid gland.

Oxygen consumption, however, is a very complex physiological matter which is influenced in many ways. In addition to the thyroid gland, it is affected by the pituitary gland, the adrenal gland, and the state of protein metabolism. Also oxygen transport is an important factor, (there have been several reports in the literature of decreased circulation time in schizophrenic patients), and also tissue utilization of oxygen may be defective for various reasons. The finding of low basal metabolic rate in schizophrenic patients, then, though commonly associated with some malfunction of the thyroid gland, could be due to a large number of other circumstances, or if due to subnormal activity of the thyroid gland, could be an intermediate reflection of disordered metabolism elsewhere. The nutritional status of patients in this study was good. Hence, nutritional deficiency was not a factor in any of the results obtained by metabolic studies.

### Results

Basal metabolic rates of 48 psychiatric patients were compared with basal metabolic rates of 173 normal subjects. Of the 48 psychiatric subjects, 26 were schizophrenic, 15 were manic-depressive, (4 manic and 11 depressive), and 7 were psychoneurotic. The results are as follows:

BASAL METABOLIC RATE

| | No. | Mean | St. Dev. | Range |
|---|---|---|---|---|
| Controls | 173 | plus 4.3 | 16.6 | minus 36 - plus 59 |
| Total Psychiatric Pts. | 48 | minus 4.5 | 12.58 | minus 32 - plus 29 |
| Schizophrenic | 26 | minus 6.46 | 9.46 | minus 31 - plus 7 |
| Manic-Depressive | 15 | plus 2.67 | 12.50 | minus 19 - plus 29 |
| Manic | 4 | plus 8.25 | 14.31 | minus 8 - plus 29 |
| Depressive | 11 | plus 0.636 | 11.10 | minus 19 - plus 27 |
| Psychoneurotic | 7 | minus 12.29 | 14.90 | minus 32 - plus 14 |

The difference in means between the total psychiatric and control groups is significant beyond the 0.01% level. (The probabilities are only 1 in 10,000 that this difference is due to chance.) This is found to be due primarily to the schizophrenic and psychoneurotic groups, whose means are most different from the controls. The mean of the schizophrenic group is significantly different from the control group at the 0.1% level, and the mean of the psychoneurotic group at the 1.0% level. Both these groups of patients have lower basal metabolic rates than the controls. The mean of the manic group is not significantly different from the controls. Distributions are shown in Figure 8, page 16.

Thus in this study, as in so many others, it is again demonstrated that basal metabolic rate is lower in schizophrenic patients than in normal controls.

## PLASMA CHOLESTEROL

There have been many reports of plasma cholesterol levels in patients with mental disease. Some investigators have found that cholesterol is higher than normal, others that it is low, and others that the range is greater than in normal subjects.

The alterations in plasma cholesterol levels in thyroid disease are well known. It should be stressed

however, that the findings of high plasma cholesterol levels in myxedema and low levels in thyrotoxicosis were chance discoveries which have been used empirically to help in the clinical diagnosis of abnormal thyroid states. Except that such levels reflect an alternation in fat metabolism which is indirectly influenced by the thyroid gland, the relationship between these abnormal cholesterol levels and thyroid physiology is unknown. Hyper-and-hypocholesterolemia occur also in many other diseases and may be related to dietary intake.

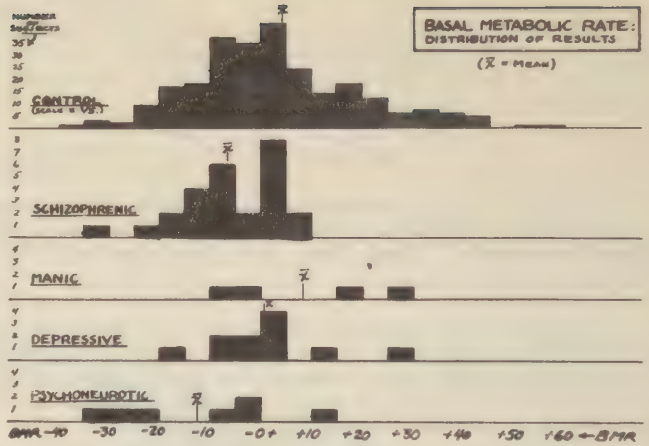


Figure 8.

Results:

Plasma cholesterol on 49 psychiatric patients was compared with 237 controls. Of the patients, 26 were schizophrenic, 16 manic-depressive (5 manic and 11 depressive), and 7 psychoneurotic.

There are no significant differences in the means of control and psychiatric patients, nor of controls and psychiatric subgroups, nor of psychiatric subgroups compared with each other on the plasma cholesterol test.

Results on Repeated Tests:

As stated earlier, these four tests were repeated from one to four times on each patient before, during and after therapy. Extensive statistical analysis up to this time has shown no significant difference on repeat tests for any of the four tests administered, when analyzed by diagnostic groups. This is true despite the fact that the clinical condition of many of the patients had changed at the time repeat tests were done. An analysis of repeat tests on patients who improved compared to those who did not improve will be published at a later date.

## SUMMARY

This is a report of a two year study of thyroid function in patients with mental disease, and in controls. Four tests were used: serum protein-bound iodine, radioactive iodine, basal metabolic rate, and plasma cholesterol. Each of these tests reflects a different aspect of thyroid physiology. It was hoped that a pattern of these four tests together would give a better picture of the status of the thyroid gland in mental disease than any single test. Thyroid status was also carefully evaluated clinically.

Data for all four tests are given on 61 subjects; 49 patients and 12 controls. A number of additional patients were given the serum protein-bound iodine test alone, thereby increasing the sample on this test. On each separate test patients are compared with large numbers of control subjects studied separately, as well as the 12 control subjects studied with all four tests.

The tests or measures on which psychiatric patients as a group were found to be significantly different from controls are indicated in the chart below. Results on thyrotoxic and myxedematous patients are listed for comparison. Measures on which the means are obviously different from the controls by inspection, but found not to be significantly different upon statistical analysis (usually because the sample is too small) are listed in parentheses. A blank space indicates no difference from controls.

PSYCHIATRIC, THYROTOXIC AND MYXEDEMATOUS PATIENTS COMPARED WITH CONTROLS

PBI, RAI, BMR and Cholesterol Tests

| Test | Schizophrenic | Manic | Depressive | Psychoneurotic | Thyrotoxicosis | Myxedema |
|---|---|---|---|---|---|---|
| PBI | | LOWER | LOWER | | HIGHER | LOWER |
| RAI | | | | | | |
| % Maximum Uptake | HIGHER | LOWER | | | HIGHER | LOWER |
| % Per Hour | (higher) | (lower) | | (lower) | HIGHER | LOWER |
| % in 3 - 4 Hours | | (lower) | | (lower) | HIGHER | LOWER |
| Time to Maximum | | (faster) | (slower) | | FASTER | |
| BMR | LOWER | (higher) | | LOWER | HIGHER | LOWER |
| CHOLESTEROL | | | | | LOWER | HIGHER |

From the preceding summary chart it can be seen that:

1. The schizophrenic group has a significantly higher % maximum uptake of radioactive iodine, and a significantly lower basal metabolic rate than controls. Thus the avidity of the thyroid gland for iodine is greater, and oxygen consumption is lower in this group. Findings on these two tests are not consistent in the direction of hyper-or hypothyroidism. Furthermore, serum protein-bound iodine, representing circulating thyroid hormone, is normal. This might mean, physiologically, that (1) there is a qualitative defect in the composition of circulating thyroid hormone that impedes proper oxygen consumption in the tissues, or (2) low-normal oxygen consumption in schizophrenics, though present, is unrelated to thyroid function. The high-normal uptake of radioactive iodine by these patients is difficult to explain. It might represent a borderline depletion of iodine in the gland (there is no evidence that this is due to dietary lack). Thus one could speculate that in the schizophrenic the thyroid gland is functioning in a borderline fashion, able to retain enough iodine in the gland to maintain circulating organic iodine at normal levels, but perhaps without reserve to withstand stress. Or it may simply indicate an isolated hyperactivity, an instability of the gland, sympathetic or endocrinological.

2. The manic group has a significantly lower % maximum uptake of radioactive iodine and a significantly lower serum protein-bound iodine than the controls. This indicates decreased incorporation of inorganic iodine into the thyroid gland, and a lowered circulating thyroid hormone. These findings are consistent in the direction of low-normal thyroid function in the manic group. This is the opposite of what one would expect from their clinical picture. These findings could possibly indicate (1) thyroid exhaustion or (2) reciprocal inhibition of thyroid activity as the result of pituitary hyperactivity.

3. The depressive group has a significantly lower serum protein-bound iodine than the controls, indicating lower circulating thyroid hormone. There is also a suggestion of a slower uptake of radioactive iodine. These findings in the depressive group suggest low-normal thyroid function. This is consistent with their clinical retardation, and could represent inhibition of thyroid activity, sympathetic or endocrinological. These findings, however, are not entirely consistent relative to total thyroid function, because other measures of radioactive iodine (% maximum uptake, rate per hour, etc.) and basal metabolic rate are normal in this group.

4. The psychoneurotic group is significantly different from the controls only in having lower basal metabolic rate, indicating lower oxygen consumption. There is little contributory evidence that this is related to the thyroid gland.

In addition to the above it was found on the serum protein-bound iodine test that those patients classified as schizophrenic are not a homogeneous group. They fall distinctly into two groups, one classified as predominantly catatonic and "other types", the other as predominantly paranoid in type. The catatonic and "other" patients have low-normal serum protein-bound iodines as a group; the paranoids, high-normal. The difference in the means of these two groups on this test shows a very high level of significance. This diphasic distribution of the schizophrenic group was not found on the other three tests of thyroid function.

## CONCLUSIONS

The problems of interpretation are many in a research endeavor such as the present. The differences that have been found, though statistically significant, are small, and the means of all groups on all 4 tests, though different from the controls as indicated, fall within the normal range. The physiological variables studied are non-specific, each being influenced by a number of internal and external factors. Therefore it is difficult to know exactly what each test is measuring. The test measurements are relatively gross and subject to various errors in spite of the care taken to prevent this, and the samples of patients studied are small (when the sample is large, such errors theoretically cancel out). An attempt has been made to correlate results of these test measurements with clinical diagnosis, and the difficulties of exact psychiatric diagnosis are well known.

Because of these problems which exist in all research on human subjects in medicine, but particularly in psychiatry, an over-all interpretation of results in this study in terms of thyroid function is difficult; however, in answer to our original questions, it seems warranted to conclude that:

1. Thyroid function in groups of schizophrenic, manic, and depressive patients is significantly different from normal controls as measured by a pattern of the 4 tests used in this study, but is normal by clinical evaluation and the test results fall within the normal range. The pattern for the psychoneurotic group is most like the normal.

2. Thyroid function in schizophrenic, manic, and depressive patients is significantly different from patients with thyrotoxicosis and myxedema, in that the test results fall within the normal range, and the patterns of test results on all 4 tests taken together are unlike those in patients with known thyroid disease.

3. Thyroid function in schizophrenic, manic, depressive, and psychoneurotic patients is different among the 4 groups. The patterns of test results are different, with many seeming inconsistencies.

XIV. Blood Transfusions - Capt Marjorie G. Gillard, ANC, 35th Sta Hosp, APO 25, Unit 6

Blood transfusions are one of the most valuable life saving procedures in modern medicine. However, it is not until the middle of the 17th century that authentic references to blood transfusions are to be found.

In 1900 Landsteiner reported the most important single discovery; that is the presence of iso-agglutinating and iso-agglutinable substances in human blood. Then the following year he divided blood into groups with regard to their agglutinating reactions. In 1910 the work of Moss called attention to the importance of selection of suitable donors for blood transfusions. The present Landsteiner types of AB-A-B-O coincide with Moss I-II-III-and IV. Moss I and Landsteiner AB being universal recipients while Moss IV and Landsteiner O are the universal donor types. However, as more transfusions were administered it was found that neither the universal donor nor universal recipient could be accepted without danger. In recent years the isolation and addition of the complex carbohydrate A and B substances the universal donor has again been rendered safe. With the experience and research of the past 10 years Rh determination has been added to blood typing, again decreasing danger.

Probably the most pre-eminent indication for a blood transfusion is hemorrhage. The blood loss due to trauma from wounds or operation, vascular erosion as in bleeding ulcer or tuberculosis, or defective coagulation of the blood of the hemophiliac has been replaced to save countless lives. It is a treatment of great importance in shock, hypoproteinemia, blood dyscrasias, which includes leukemia, infection, poisoning and the debilitating condition resulting from chronic diseases and malnutrition.

There are few contraindications to transfusion. Of these the most important are acute pulmonary edema, cardiac decompensation and pulmonary embolism. Fortunately a transfusion is rarely indicated as a treatment for these conditions.

With the banking of blood, storage and preservation become a problem. Fresh blood with the anticoagulant sodium citrate to keep it liquid is given to the recipient immediately or it must be refrigerated. If only sodium citrate has been added, blood begins to undergo degenerative changes within a few hours and is then classed as stored blood. Stored blood should not be used after 7 days. The addition of dextrose solution prolongs the life of the red cells and the use of ACD solution (Citric acid, Sodium citrate, Dextrose) extends the time to 21 days and gives preserved blood. All blood must be refrigerated at 4 degrees C. Regardless of the method of preservation hemolysis will occur.

Blood transfusions are now regarded as a minor and relatively safe procedure, but the personnel responsible must remain aware of the danger. Improper typing and cross matching may result in a serious reaction and death. Improper cleaning and sterilization of equipment may result in a reaction.

The hemolytic reaction is due to: the red cells of the donor being incompatible with the serum of the recipient, or hemolysis occurring before the blood is administered. In either case the cause of the reaction is the presence of free hemoglobin in the blood stream.

The symptoms of hemolytic reaction usually occur during or immediately following the transfusion. The patient will complain of a tingling sensation, fullness of the head, generalized discomfort, a constricted feeling of the chest and severe pain in chest and lumbar region. Evident signs of collapse usually occur; rapid weak pulse, cold clammy skin, flushed face, dyspnea, cyanosis, drop in blood pressure, and nausea and vomiting. Immediately following the first signs there will be a severe chill and sharp rise in temperature. Heat should be applied, sedatives are usually ordered and if necessary oxygen is administered for dyspnea and cyanosis. Following this first stage the passage of dark red urine indicates hemoglobinuria. There is generally a period of several days when the patient is asymptomatic before oliguria develops and frequently jaundice. This phase is followed by anuria with symptoms of uremia and the patient gradually sinks into a comatose state. Death usually occurs a week or two after the transfusion. The prognosis depends on the amount of blood injected, the functional capacity of the kidneys and the general condition of the patient. The treatment is aimed at the stimulation of kidney function. Hypertonic and isotonic intravenous fluids are administered, the urine is alkalinized, and recently the artificial kidney, peritoneal lavage and exchange transfusions have been employed to remove the urea, and other waste products that the damaged kidneys cannot handle.

Proteoltic reactions are allergic in nature manifested by urticaria and slight angioneurotic edema which are treated with antihistaminic drugs or adrenalin. The severe form, however, resembles anaphylactic shock which is usually immediately fatal.

Another complication of importance is circulatory overload. It is due to the excessive increase of blood volume by giving too large amounts or giving the blood too fast. It may be rapidly fatal from a dilated heart with subsequent failure and pulmonary edema. This is characterized by sudden onset of dyspnea, cyanosis, gurgling noises in the bronchi, and often coughing up red frothy liquid. Prompt stopping of the transfusion and treatment is necessary. Tourniquets may be applied to trap the blood in the extremities, a phlebotomy is sometimes done and oxygen and morphine are administered.

The most frequent complication pyrogenic reaction is the one caused by the improper cleaning of equipment. These reactions are caused by pyrogen, which are heat stable substances produced by bacteria, or dried plasma proteins not removed from the rubber tubing. They are characterized by chills and fever during or following the transfusion. Fortunately these reactions are not serious except to a very ill patient, but the blood should be stopped and returned to the laboratory for regrouping and cross matching rather than taking for granted that the reaction is pyrogenic. External heat may be applied at the time of chill, and fever lasts but a few hours.

Transfusion methods have progressed from two quills connected to an animal's bladder through many complicated systems of direct procedures, including anastomosis of the vessels of donor and recipient to the present simple indirect set. The most efficient means of collecting blood from a donor is the commercially prepared vacuum bottle. This bottle contains sodium citrate or ACD solution and the partial vacuum for drawing the blood from the vein. A simple valve with a needle to be inserted through the rubber cap of the bottle is connected by a short piece of heavy walled tubing to the needle placed in the donor's vein. The site of veni-puncture must be surgically prepared and a small amount of novocaine injected to eliminate the discomfort of inserting the large gauge needle necessary for the rapid and easy flow of blood. The donor bottle should be gently agitated to avoid undue trauma to the red cells. A blood pressure cuff used as a tourniquet will insure a venous block without constricting the arterial flow. To administer the blood a filter drip connected to the needle in the patient's vein with intravenous tubing, filters the blood through a wire mesh cylinder and allows for easy regulation of the rate of flow. Usually blood is given at the rate of 50 drops per minute. This however is regulated by the condition of the patient. In cases of shock or great blood loss, the rate would be faster while a patient having a cardio-respiratory disturbance could not tolerate rapid increase in blood volume.

There are several special kinds of transfusions. The auto transfusion, performed by scooping or sucking the blood from the chest or peritoneal cavity, citrating it and putting it back into the vein has been used in cases such as ruptured ectopic pregnancy and ruptured spleen. Exsanguino-transfusion, which is the withdrawing the patient's blood and replacing it at the same time with blood from donors is used in some cases of poisoning and in erythroblastosis of the newborn. Exchange transfusions or the continuous transfusion of blood from donor to recipient and from recipient to donor have been used on patients suffering from anuria. In some cases the anuria is the result of a hemolytic reaction to a previous transfusion. Also immuno-transfusion, where a donor who has recovered from a condition such as septicemia or undulant fever is used to give blood to a patient suffering from the same condition.

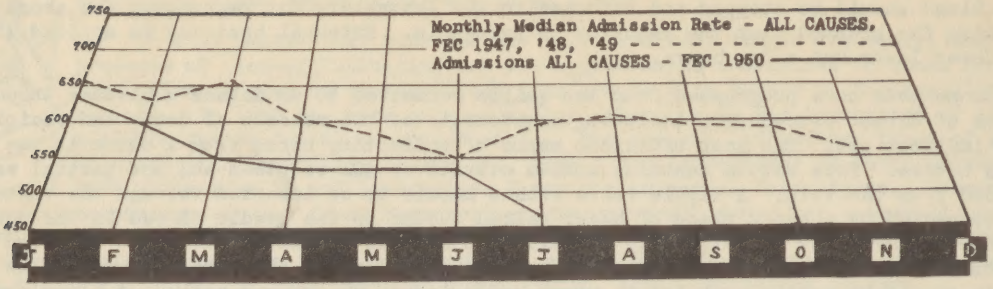
Cleaning and sterilizing equipment is primarily the nurses responsibility. There are many different ways of doing this. Drug companies are marketing special preparations for cleaning. The Baxter laboratories recommend the following procedure. New tubing is thoroughly washed inside and out with distilled water to remove excess chemicals. Place tubing in deep dish of sodium carbonate solution (50 gm of sod. carbonate per liter of distilled water) being sure the lumen is completely filled. Place dish in sterilizer for 15 minutes at 250 degrees F. Thoroughly rinse out all carbonate solution with tap water followed with nonpyrogenic distilled water, using a syringe for forcing to and fro of not less than 200 cc of the water. Assemble tubing into sets and rinse with nonpyrogenic distilled water and immediately sterilize at 250 degrees F. for 15 minutes. After use rinse the donor set with freshly distilled water. Disassemble and remove any residual clots. Wash all parts in tincture of green soap solution. If clots remain in tubing or valve immerse in 28% ammonium hydroxide solution for 10 minutes and then rinse in distilled water. When reassembled, flush with sterile normal saline to remove the remaining distilled water. Leave the valve open 1/4 turn, wrap and autoclave 20 minutes at 15 pounds pressure. The recipient set should be rinsed with distilled water immediately after use. Disassemble and wash thoroughly with a solution of tincture of green soap, followed by a rinse with freshly distilled water. The mesh cylinder should be placed in a bottle of concentrated nitric acid and allowed to soak 24 hours. Remove the filter from the nitric acid and rinse thoroughly with several portions of freshly distilled water. Assemble the set and rinse with normal saline. Wrap and sterilize for 20 minutes at 15 pounds pressure. Of course the ideal transfusion sets are the commercially prepared and sterilized disposable sets now available, that further eliminate the reaction danger.

## WHOLE BLOOD FOR KOREA

To meet the requirements of our forces in Korea, a Blood Bank was established by the 406th Medical General Laboratory, Tokyo, Japan. The Bank is divided into 3 Sections: The Collecting and Processing Center located in Tokyo; the Blood Bank Depot in Fukuoka, and Advanced Blood Bank Depots in Korea as required. The first plans called for the actual blood collection to begin 10 July. However, the increasing seriousness of the operations in Korea demanded that whole blood be made available to the casualties immediately. Hence the first group of volunteers was called on 7 July at 1400 hours. As of 24 August, a total of 5,888 bottles of blood had been collected by the 406th Blood Bank. In order to insure prompt delivery to the using agencies, a liaison and courier group was organized. When the first medical installation was made operational in Korea, ample supply of whole blood was available.

PART III - STATISTICAL

## HEALTH OF THE COMMAND




Admission rates per 1000 troops per annum for the 4-week period ending 28 Jul 50 were as follows:

| | FEC | JAPAN | MARBO | PHILCOM(AF) | RYCOM |
|---|---|---|---|---|---|
| All Causes | 468 | 507 | 286 | 240 | 494 |
| Diseases | 413 | 451 | 223 | 202 | 445 |
| Injuries | 53 | 55 | 62 | 38 | 50 |
| Psychiatric | 9.3 | 10 | 1.4 | 6.9 | 10 |
| Common Respiratory Diseases and Flu | 32 | 36 | 26 | 10 | 31 |
| Primary Atypical Pneumonia | 2.9 | 2.3 | 1.4 | 0 | 6.4 |
| Common Diarrhea | 3.1 | 2.1 | 0 | 0 | 8.7 |
| Bacillary Dysentery | 1.0 | 0 | 0 | 0 | 5.2 |
| Amebic Dysentery | .11 | .18 | 0 | 0 | 0 |
| Malaria, new | .46 | .35 | 0 | 3.4 | 0 |
| Infectious Hepatitis | 4.6 | 6.4 | 1.4 | 1.7 | 1.2 |
| Mycotic Dermatoses | .80 | 1.2 | 0 | 0 | 0 |
| Rheumatic Fever | .57 | .71 | 0 | 1.7 | 0 |
| Venereal Diseases | 142 | 152 | 8.1 | 74 | 190 |

Adequate records were not available for the computation of data on US Forces in Korea during July. This report pertains to Army and Air Force personnel of the FEC other than Korea. During the month of July, for Army and Air Force personnel, the FEC experienced an all causes admission rate of 468 per 1000 per annum. This is the lowest hospital, quarters and dispensary admission rate so far experienced in the command. This is a decrease from 534, or about 12%, in June and is considerably lower than the previous all time low of 530 which occurred in November 1949. All major commands experienced a decrease in their admission rate, especially Japan, MARBO and PHILCOM (AF). For the FEC both components, diseases and non-battle injuries, of the all causes admission rate, decreased as follows: Diseases from 476 in June to 413, and non-battle injuries from 58 in June to 53. Of interest was the fact that 5 of the 40 odd reportable diseases or disease groups, namely common respiratory diseases and flu, total scarlet fever and streptococcal sore throat, Vincent's angina, mycotic dermatosis and scabies had an unprecedented low incidence. In addition to the above diseases, the syphilis rate of 9.9 was the lowest since July 1947. Various circumstances surrounding the Korean situation have probably contributed to the current downward fluctuation of the reported all causes admission rate. There was no unusual incidence of diseases reported among military personnel in the command during this report period.

The average daily non-effective rate per 1000 increased from 15 in June to 18 for July. RYCOM and PHILCOM (AF) had slight decreases; MARBO had a rather insignificant increase from 10 in June to 12 this month, whereas Japan's rate increased from 13 to 19. Japan's increase is due to the transfer of units from Japan leaving their hospitalized cases behind; also, many patients were evacuated from Korea (thereby increasing the number of patients and at the same time decreasing the mean strength of Japan). The non-effective rate of the FEC continues to compare favorably with rates of US Forces in other geographical areas.

DISEASES: Common Respiratory Diseases and Influenza: The rate for CRD and influenza decreased from 42 per 1000 per year in Japan to 32 this month, and as mentioned in paragraph 1 above, is an all-time low.

Malaria: Although this is about the peak of the malaria season, the incidence of this disease continues very low. The rate for July was 0.46 as compared to rates of 6.5, 9.1, and 17 for the same month in 1949, 1948 and 1947 respectively. Japan and PHILCOM (AF) reported the only cases for this period. RYCOM, again for the 6th consecutive month, reported no cases.

Diarrhea and Dysentery: The incidence of intestinal diseases infections remains rather static. The FEC rate for July was 4.4 as compared to 4.9 in June. MARBO and PHILCOM (AF) reported no cases for the month. RYCOM experienced a decline from a rate of 20 in June to 14 in July, while Japan's rate remained about the same, 2.5.

Infectious Hepatitis: A decrease in the infectious hepatitis rate from 5.9 for the previous month to 4.6 for July is noted. Although the June rate was not considered necessarily high, there had been an upward trend during the past several months.

Poliomyelitis: Through July this year, there have been 31 confirmed cases of polio reported among all occupation personnel, including Korea, with 2 deaths resulting. For the same period in 1949, 32 cases had occurred, with 1 death resulting.

Venereal Diseases: For the 6th consecutive month, the total venereal disease rate remained rather static. A minor decrease from 145 in June to 142 this month was experienced. White troops had a decrease from 141 in June to 132 in July as contrasted to an increase among colored troops from 178 to 246. Among the major commands, slight decreases were reported by all except RYCOM which had an increase from 126 per 1000 per annum to 190. RYCOM's increase is attributed equally to white and colored troops.

Non-Battle Injuries and Deaths: The non-battle injury rate presents a decrease from 58 in June to 53 in July. This rate more closely parallels the average monthly rate. 39 deaths were reported during July, 10 of which resulted from diseases, 19 from non-battle injuries and 10 from battle casualties evacuated from Korea.

Evacuation:


Tabulated below are the number of patients evacuated from the major commands to the ZI during the 4-report weeks in July and the number of patients awaiting evacuation as of 28 July 1950:

| | BY AIR | BY WATER | TOTAL | PNTS AWAIT EVAC |
|---|---|---|---|---|
| JAPAN | 367 | 16 | 383* | 66 |
| MARBO | 12 | 0 | 12 | 5 |
| PHILCOM (AF) | 15 | 24 | 39 | 1 |
| RYCOM | 47 | 24 | 71 | 19 |
| FEC | 441 | 64 | 505 | 91 |

(* One patient originated from RYCOM; 79 originated from Korea.)

Hospitalization:

The bed status as of 28 July 1950 was as follows:

| | Bed Capacity | | Operating | | % Normal Bed | % of Operating |
|---|---|---|---|---|---|---|
| | Normal | Mobilization | Beds | Beds Occupd. | Capacity Occupd. | Beds Occupd. |
| JAPAN | 3,957 | 5,672 | 3,790 | 2,188 | 55 | 58 |
| MARBO | 200 | 200 | 200 | 79 | 40 | 40 |
| PHILCOM (AF) | 1,919 | 2,415 | 669 | 427 | 22 | 64 |
| RYCOM | 250 | 300 | 250 | 130 | 52 | 52 |
| FEC | 6,326 | 8,587 | 4,909 | 2,824 | 45 | 58 |

## IN THIS ISSUE





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The Chief Surgeon extends an invitation to all personnel of the Medical Department to prepare and forward, with view to publication, articles of professional or administrative nature. It is assumed that editorial privilege is granted. Copy should be forwarded so as to reach the Medical Section, GHQ, FEC, not later than the 10th of the month preceding the issue in which publishing is desired.

Major Vincent I. Hack, Editor